SandyDuck'97 Nearshore Field Experiment Data Archive

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LONG-TERM GOALS

The long-term goal of this effort is to compile and distribute data collected during the SandyDuck'97 nearshore field experiment so that these data may be accessed by coastal researchers worldwide.

OBJECTIVES

Conducted in the fall of 1997, SandyDuck '97 was an intense, large-scale, investigation of surf zone winds, waves, currents, sediment transport, and morphology within a 1 x 0.5 km region at the U.S. Army Corps of Engineers Field Research Facility (FRF) in Duck, North Carolina. SandyDuck and its predecessor DUCK94 (1994), were sponsored by the Office of Naval Research, the US Army Corps of Engineers, and the US Geological Survey. SandyDuck '97 experiment included 30 investigations of varying complexity, using a variety of instruments (Table 1). While the collected data were initially of interest to the participating investigators, they are also useful to a wide range of government, academic, and private researchers. By agreement it was resolved that experimenters' data would become publicly available three years after the experiment. The goal of this work is to compile the most important SandyDuck '97 geophysical nearshore process data into a single coherent data set, and to make the data publicly available via the web for broad usage by those interested in physical processes in the littoral zone. The SandyDuck '97 data set will be added to the DUCK94 data sets previously archived (http://dkserv.usace.army.mil/jg/dk94dir), along with the recent addition of the 1990 DELILAH experiment data.

APPROACH

The SandyDuck data include a wide variety of data types stored by the individual investigators in many different formats on a network of widely distributed computers and media. Some data sets are of wide general interest, others are not. Some of the data are thoroughly described and quality controlled by the principal investigators, much will not be. As the data are used in more and more research projects it will continue to be refined and better understood. Because of these considerations, we have

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Table 1. SandyDuck Experiments (ONR projects in bold, partial or fully funded)			Wave Shoaling	Nearshore Circulation	Boundary Layers	Swash Processes	Small Scale Sediments	Meso/Macro Morphology	Water Properties
No.	Investigators	Experiment Title							
1	**Beach, Holman, Sternberg, Ogston, Conley**	**Fluid-sediment interactions in the surf zone**		**X**	**X**		**X**		
2	**Drake, Snyder**	**Side-scan sonar studies of nearshore morphology in the vicinity of Duck, NC**						**X**	
3	**Dugan**	**Nearshore measurements for long-range remote sensing**		**X**				**X**	
4	**Edson**	**Application of a marine surface layer model to the Coastal Environment**			**X**				
5	**Elgar , Herbers, O'Reilly, Guza**	**Surf zone waves currents and morphology**	**X**	**X**		**X**		**X**	
6	Friedrichs, Brubaker, Wright, Vincent	Cross-shoreface suspended sediment: a response to the intersection of nearshore and shelf processes		X	X		X		
7	Haines, Gelfenbaum, Wilson	Vertical structure, bedforms, turbulence		X	X		X		
8	**Hanes,Vincent**	**Near bed intermittent suspension**		**X**			**X**		
9	**Hay, Bowen, Doering, Zedel**	**Nearshore sediment dynamics: suspension, bedforms, and bubbles**		**X**	**X**		**X**		**X**
10	**Heitmeyer**	**Surf-noise experiment**							**X**
11	**Herbers, O'Reilly, Guza**	**Wave propagation across the continental shelf**	**X**						
12	**Holland, Sallenger**	**Swash zone morphology**				**X**			
13	**Holman**	**Large scale morphology**						**X**	
14	Howd, Beavers	Geologic signature of storm events on the inner continental shelf and outer surf zone						X	
15	**Howd, Hathaway**	**Shoreface processes and bed response**	**X**	**X**				**X**	
16	Jensen	Evolution of wave spectra in shallow water	X						
17	Jol	Ground penetrating radar of the beach						X	
18	**Lippmann**	**Observations of nearshore wave breaking, whitecapping, and large scale sand bar morphology**	**X**		**X**				
19	List	Regional shoreline change						X	
20	Long	Wind wave frequency-direction spectral measurements	X						
21	Miller, Resio	Sediment transport rates during storms		X	X		X		
22	Sallenger	Coastal applications of scanning airborne laser (LIDAR)						X	
23	**Smith**	**Observations of waves and currents near the surf zone**	**X**	**X**					
24	**Su, Teague**	**Coastal breaking wave and bubble measurements**							**X**
25	**Svendsen, Grosskopf**	**Models of nearshore circulation**	**X**	**X**					
26	**Thornton, Stanton**	**Nearshore wave & sediment processes**	**X**	**X**	**X**		**X**		
27	**Trizna, Kirby**	**Experimental tests of Boussinesq wave models in the near surf zone**	**X**	**X**					
28	**Trizna**	**Marine radar remote sensing of bar & rip morphology**						**X**	
29	**Trowbridge**	**Measurement of bottom stress in the wind- and wave-forced nearshore environment**	**X**	**X**	**X**				
30	Wu, Shih, Kobayashi	Nearshore water level profiles during storms	X						X

adopted and adapted a UNIX/web based data management system originally developed for the Joint Global Ocean Flux Study *(JGOFS)*. It has several features that make it desirable for this application.

Even though the JGOFS server was designed for serving distributed data sets it was decided for practical purposes, to use a single server for the data. This alleviated requiring multiple investigators to maintain web servers for access to their data, and insures that the data remain online, even as interest by the collecting investigators wanes. The original data were translated into a common format, columnar ASCII files which are MATLAB and spreadsheet compatible, making them easy to use by all users. Times were adjusted to Eastern Standard Time and units were converted to MKS. Identical formats have been used for similar data types collected by different investigators (mean current statistics, wave height measurements, etc.).

Some data were not compatible with the data server and are handled by other web tools such as FTP and HTML pages. In particular the "raw" binary time series sampled from single-channel sensors (current component, pressure, optical backscatterance, sonic altimetry, temperature, wind speed, wind direction, etc.), could not be efficiently delivered with a columnar ASCII format but are available with FTP in organized directory structures with associated metadata. Digital image data (camera snapshots, time-averaged images, movie loops of various processes) are delivered with static web pages and FTP

WORK COMPLETED

Approximately 150 GB of SandyDuck data were received and duplicated for the backup archive, maintained at an offsite location. The two most prominent data sets, FRF and SPUV (Elgar, Herbers, O'Reilly, Guza) data, have been processed and put on the server. Eight more data sets are in the process of being screened, reformatted, documented, and close to installing on the server. A delay in receiving data from some SandyDuck PI's caused a slow start on processing data and inclusion on the server. Additional data sets will be received and added to the server in FY04.

The SandyDuck '97 data can be found at http://frf.usace.army.mil/SandyDuck/SandyDuck.stm (Figure 1). This web page has a brief summary of the SandyDuck experiment and a link to the data server. Data from the DELILAH 1990 and DUCK94 nearshore experiments were added to the data server in FY01, complete with a data report (PDF and HTML formats), statistics, binary time series, and extensive documentation on data quality and analysis methods (metadata). There are presently 60 GB of experiment data on the server and about 140 GB to add, mainly "raw" binary timeseries.

RESULTS

The data server has proven to be an efficient means to deliver SandyDuck '97 processed data and metadata, and to provide FTP and HTML links to the remaining data sets. Feedback on the server=s data accessibility and presentation are requested and used in future refinements.

IMPACT/APPLICATIONS

By making SandyDuck data available to researchers worldwide it will hopefully achieve maximum utilization and permanence. In FY02 and FY03 27 GB of data, and 200k files, were downloaded from the server. In addition to making these data sets available to other researchers, the archive also provides high quality data for students working on Masters or PhD degrees. Based on the amount and

success of research accomplished following earlier FRF experiments, the more comprehensive SandyDuck data will have wide use and great potential for advancing nearshore science.

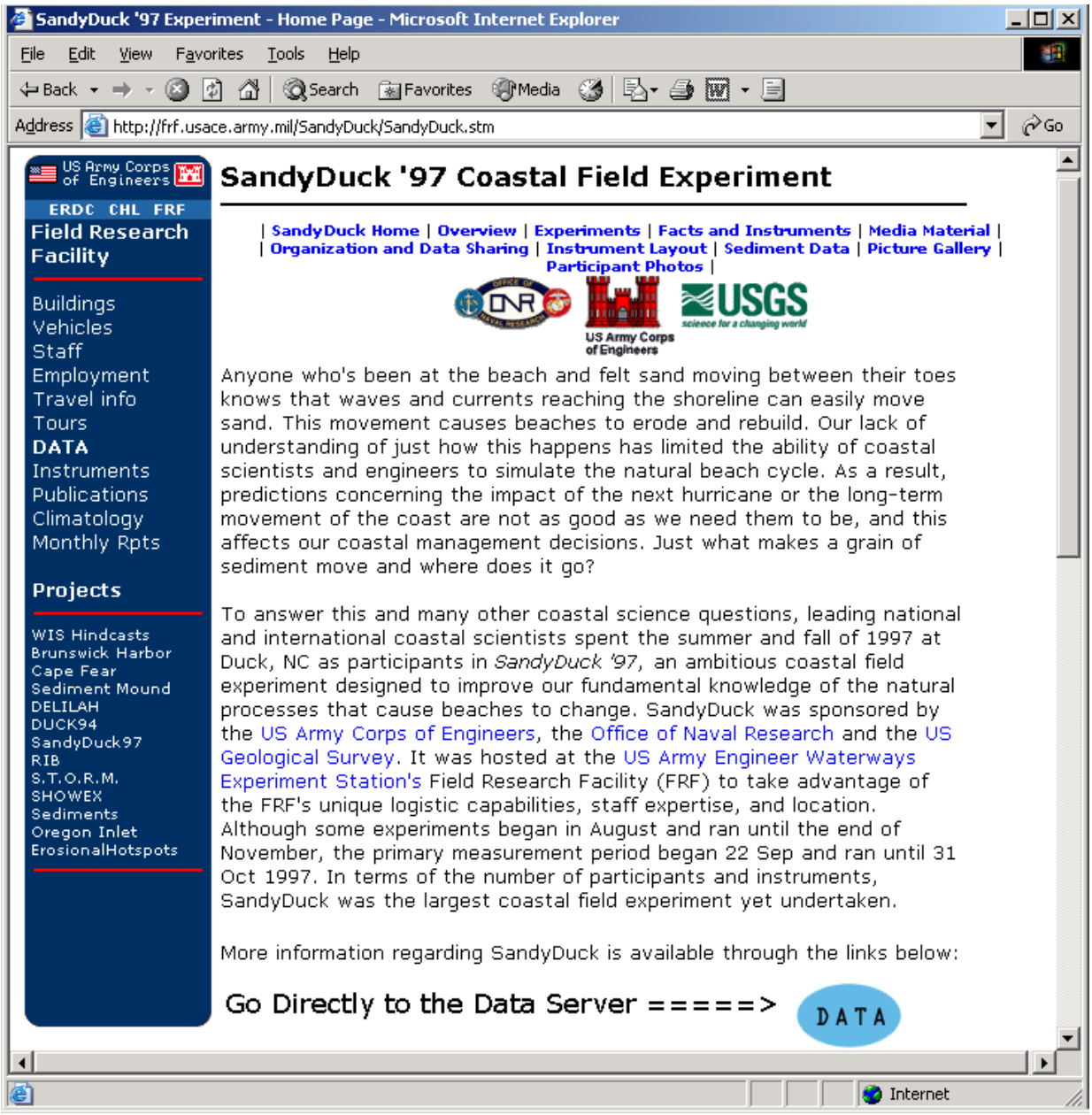

Figure 1. SandyDuck '97 home page showing funding agencies and a brief description of the SandyDuck '97 experiment. The page includes links to DELILAH and DUCK94 home pages, and a link to the SandyDuck '97 data server.

RELATED PROJECTS

The success of this effort will greatly enhance the previous effort of the DUCK94 data archive by providing a more comprehensive data set. We also plan to link this archive to the potentially more powerful Distributed Ocean Data System (DODS) to improved availability and distribution.